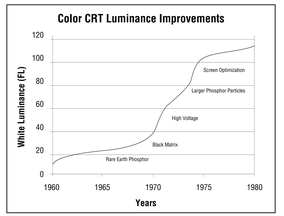
40 Years of SID Symposia – Nurturing Progress in CRT Technology

Technology Families	Pre-SID	1960's	1970's	1980's	1990's	2000's
Color Television Picture Tubes	**1950's** - Monochrome predominates - Shadow Mask CRT adopted **by RCA**	**1964** 25° Rectangular CRT with 90 degree deflection **RCA** **1964** Rare Earth Vanadate Red Phosphor **Sylvania** **1967** Rare Earth Oxysulphide Red **RCA** **1968** First Trinitron: 1 gun, 3 beams & Aperture Grille **Sony** **1969** Black Matrix Screen **Rauland** Negative Guard Band **RCA** Internal Magnetic Shield **Philips** 110 Degree Deflection **Philips**	**1972** In-line gun, Slotted mask; Phosphor Stripes **RCA** **1975** Pigmented Phosphor Screen **RCA** **1975** 30" HDTV, 0.334 mm pitch, 1510 x 1080 dots **Matsushita**	**1984** Flat Face Tension mask **Zenith** **1988** Largest CRT: 45" diagonal Color **Sony**	**1995** Internal Color Filters **Toshiba** **1996** Large Flat Face **Sony**	
Avionics	**1960** Scan Converters **1950's** Kaiser-Aiken Thin CRT for Avionics	**1960-1963** Tonotron and Multi-mode Storage Tubes **Hughes**	**1971** P43 Line Emitter Phosphor with Notch Filter **Thomas** **1978** P53 YAG Phosphor for Heads UP Displays **Ferranti** **1975** Voltage Penetration Color **Thomson**	**1982** Ruggedized 6" x 6" Color for Commercial Aircraft **Toshiba** **1985** 17" Beam Index for E2C Radar **Thomson** **1983** 5" x 5" Tension Mask High Perf. Color **Tektronix**		
Special Purpose CRTs	**1950's** - Flat Face Metal Cone 22" Monochrome for Radar - First dispenser cathode **Philips** - Charactron: character mask before deflection **Convair S/C** - Typotron: character mask plus storage **Hughes**	**1964** 4000 x 4000 pixels Photorecording CRT **CBS** **1968** 11" Direct View Storage Tube for Computer Graphics **Tektronix**	**1971** P45 White Phosphor for Medical Displays **Thomas** **1979** Phototypesetting CRT, 13" x 2" Fiber Optic Faceplate **Ferranti** **1973** 36" Round 40 kV Monochrome with 8.5" sq ft Area for Simulators **Thomas** **1970-1980** Unique Oscilloscope CRTs See Reference Note 1	**1983** Color Tube with 0.2 mm pitch for PC Monitors **Hitachi** **1983** 20"x20" Trinitron for air traffic control **Sony** **1983** Monochrome Avionics CRT with Electro-static & Magnetic Deflection **Sony**		
Searching for the Holy Grail: Flat/Thin Tubes		**1962-74** Digisplay: wire cathodes, switching grids **Northrop**		**1987** First Color FED **SRI International** **1986** First Field Emission Display (FED) **LETI-CEA**	**1993** Flat Matrix 14" Color **Matsushita** **1994** First FED Product (8"???) **PixTech** **1997** SurfaceConduction Electron Emitter Display **Canon** **1999** Carbon Nanotube Display **Samsung**	**2000** 13.2" Color FED **Candescent** **2001** Ballistic Electron Surface Emitting Display **Matsushita**

Color CRT | Storage Tube | Photorecording CRT | Oscilloscope CRT | FED



SID Award Recipients – Projection Displays

Karl Ferdinand Braun Prize

Norman Fyler
Harold Law
Edward Ramberg
Alfred Schroeder
Akio Ohkoshi
Kentaro Kiyozumi
Tadashi Nakamura
Eiichi Yamazaki

Jan Rajchman Prize

Robert Meyer
Capp Spindt

SID Fellows

William Aikin
Benjamin Kazan
Harold Law
Gentaro Miyazaki
Aron Vecht
John Constantine
Thomas Credelle
Walter Goede
Peter Barton
Makoto Ikegaki
Masakazu Fukushima
Hsing-Yao Chen
Alan Knapp
Eiichi Yamazaki
P. Neil Yocum
Mike Maeda
A. Senyo Sluyterman
Shoji Shirai
Daniel den Engelsen

Special Recognition

Peter Seats
Aron Vecht
Benjamin Kazan
Henry Marcy
Koichiro Kurahashi
Eiichi Yamazaki
Masakazu Fukushima
Robert Meyer
Harold Ketchum
Masanori Kuijk
Kinzo Nonomura
Guy Hill
Hiroshi Suzuki
Zu-Kai Wu
Makoto Maeda
Shuji Iwata
Shoji Shirai
Tokuhide Shimojo
Tsunehiko Sugawara
Yukinobu Iguchi
Soichiro Okuda
Sashiro Uemura

Reference Note 1

Oscilloscope CRTs

Pre-SID

1950's	Post Deflection Acceleration (PDA) using Wound Helix	Tektronix
1960-62	Scan Expansion using Wire-Wound Frame Grid	Sylvania/ETL Ltd.

Selected Developments for Oscilloscope CRTs

1963 Scan Expansion using Domed Mesh	Hewlett Packard
1966 5 GHz Traveling Wave Deflector	LEP/Hyperelec Brive
1969 Four Pole Scan Expansion	Philips
1977 5 GHz Deflection and Monochannel Plate	Philips
1977 400 MHz Single Shot Charge-Transfer Storage	Tektronix
1979 Box Lens Scan Expansion, Microchannel Plate	Tektronix
1983 Two-Axis Quadrapole Scan Expansion, 350 MHz Portable	Tektronix
1986 Decelerating Inverted Domed Mesh Scan Expansion, MCP	Tektronix

Reference Note 2

The criterion for inclusion in this chart is that the Cathode Ray Tube innovation must have been PRODUCED for a practical application in display hardware.
CRTs for projection have been included in the Projection Displays chart.

Legend

Color CRT
Storage Tube
Photorecording CRT
Oscilloscope CRT
FED